

A field experiment to test for density-related dispersal of hatchlings from natal sites

Bovill W¹, Downes B¹, Lester R², Holt G², Dwyer G², Chesson P³

¹ The University of Melbourne, Melbourne Victoria, Australia

² Deakin University, Waurin Ponds Victoria, Australia

³ The University of Arizona, Tucson Arizona, United States of America

High local densities of eggs may not result in high densities of hatchlings if hatchling mortality or dispersal are density-dependent. In freshwater streams, local densities of eggs are related to densities of egg-laying habitat ("emergent" rocks that protrude from the water). It is unknown whether places with high densities of emergent rocks and eggs have higher local recruitment of larvae, or whether density-dependence soon after hatching acts to modify the spatial distribution of larvae.

By manipulating the densities of emergent rocks we encouraged a gradient in the supply of caddisfly eggs across 10 sites (Taggerty River, Victoria, Australia). Samples of larvae were collected from natal riffles and dispersal pathways to compare the proportions of larvae that remain, crawl (short distance dispersal) or drift (long distance dispersal) from natal sites with increasing densities of eggs and hatchlings.

Three species of caddisflies (Hydrobiosidae) showed different relationships between densities of eggs and larvae, consistent with: (1) habitat-limitation (emergent rocks) of larval densities (*Apsilochorema obliquum*); (2) high density-independent larval mortality (*Apsilochorema gisbum*); (3) density-dependent dispersal from sites with abundant conspecifics (*Ulmerochorema rubiconum*). These outcomes suggest that mortality and dispersal during early life stages may set spatial patterns of recruitment for some aquatic insects.